A mobile phone is always with you and knows where you are, which is why mapping applications are so successful

Spring NEARC 2012

May 22, 2012

GCS Research: Introduction

John Waterman, PMP, GISP
Vice President of Geospatial Solutions, GCS Research
East Burke, Vermont
802.473.4009 - jwaterman@gcs-research.com

- Our focus:
  - GIS Solutions
  - Research & Development
  - Strategic Consulting

Microsoft Partner
Gold Independent Software Vendor (ISV)

esri Partner Network
Gold

- Our customers: local, state, tribal, federal government, and private sector.

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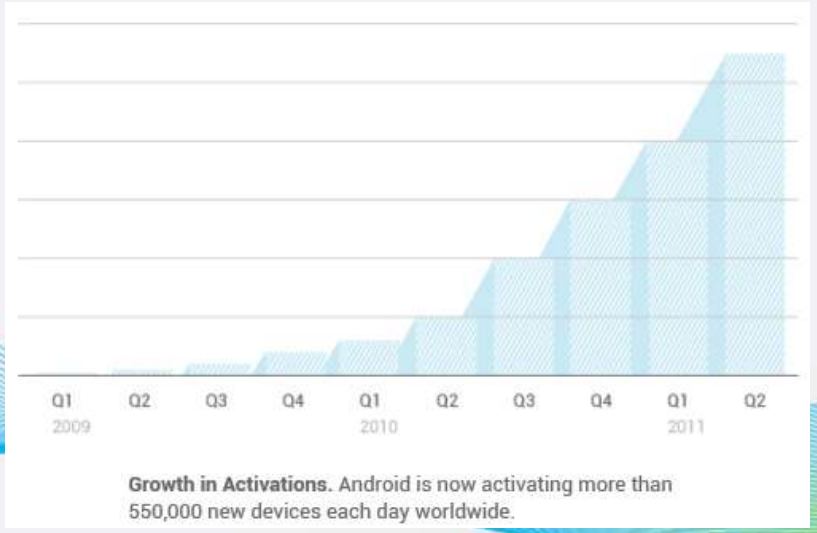
Smartphone Revolution

- Smartphone GIS mainstream in 2012
- Currently, led by Consumers
- Massive Business adoption in 2012
  - GIS Professionals: extend reach of their GIS out into the field, down the hall, and to their customers



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http://ansonalex.com/infographics/smartphone-usage-statistics-2012-infographic/

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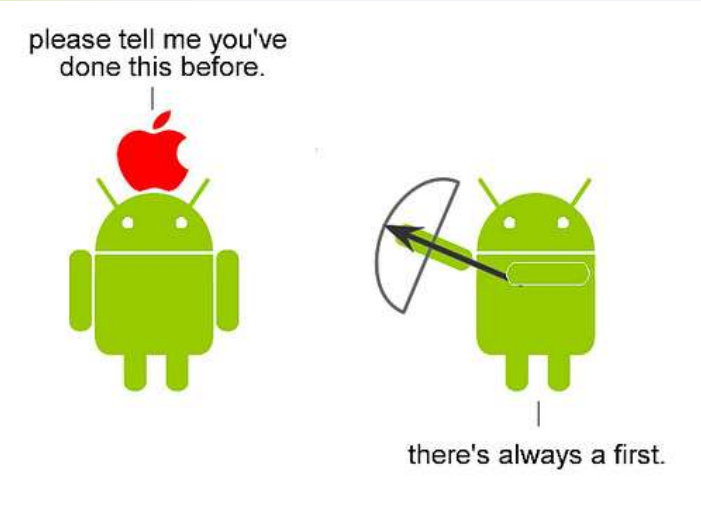
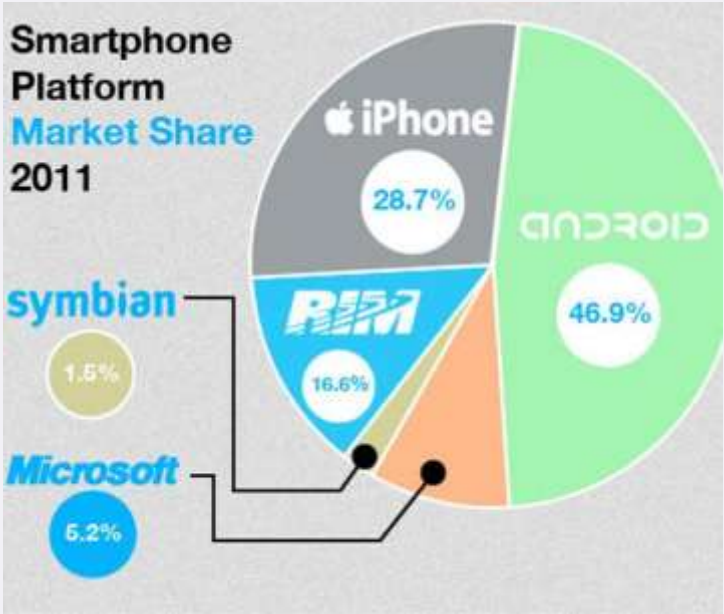
Smartphone Platform Market Share (2011)



Droid 1: Released October 17, 2009



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How do we create a mobile app?

- Budget?
- Time?
- Support All Platforms?
- Technical skillset?
- Ability to go offline? Disconnected?
- Exploit device?
- Evolving technology?

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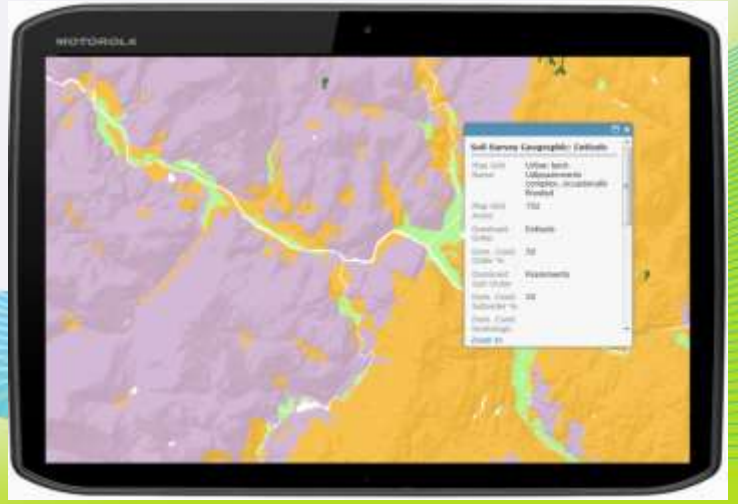
Native App vs. Web App: What are they?

- Native App
  - Application deployed with the device; Lives on device
  - Commonly, deployed application though app store / marketplace
  - Created for each mobile operating system like iOS (iPhone/iPad), Android, Windows Phone 7 or BlackBerry, etc.
  - Objective C/Java/.NET
- Web App
  - Web page accessed from the mobile device
  - A web site especially designed for mobile
  - Web languages: HTML/CSS/JS



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Native App vs. Web App: Pros/Cons?

	Native App	Web App
One app for all devices	No	Yes
Cost of development/maintenance	More	Less
Deployment	App Stores	Full Control
Performance (games, hardware intensive)	Better	
Exploit Device (Sensors, other Apps, 3rd party SDKs, Bluetooth, etc.)	Yes	No (GPS – Yes)
Usability	Better	Cannot use platform User Controls
Market Penetration	Built-in Marketing	Web Search
Payment Options	Integrated via App Store	Web
Offline or disconnected capability	Yes	No
Download on start-up	No	Yes

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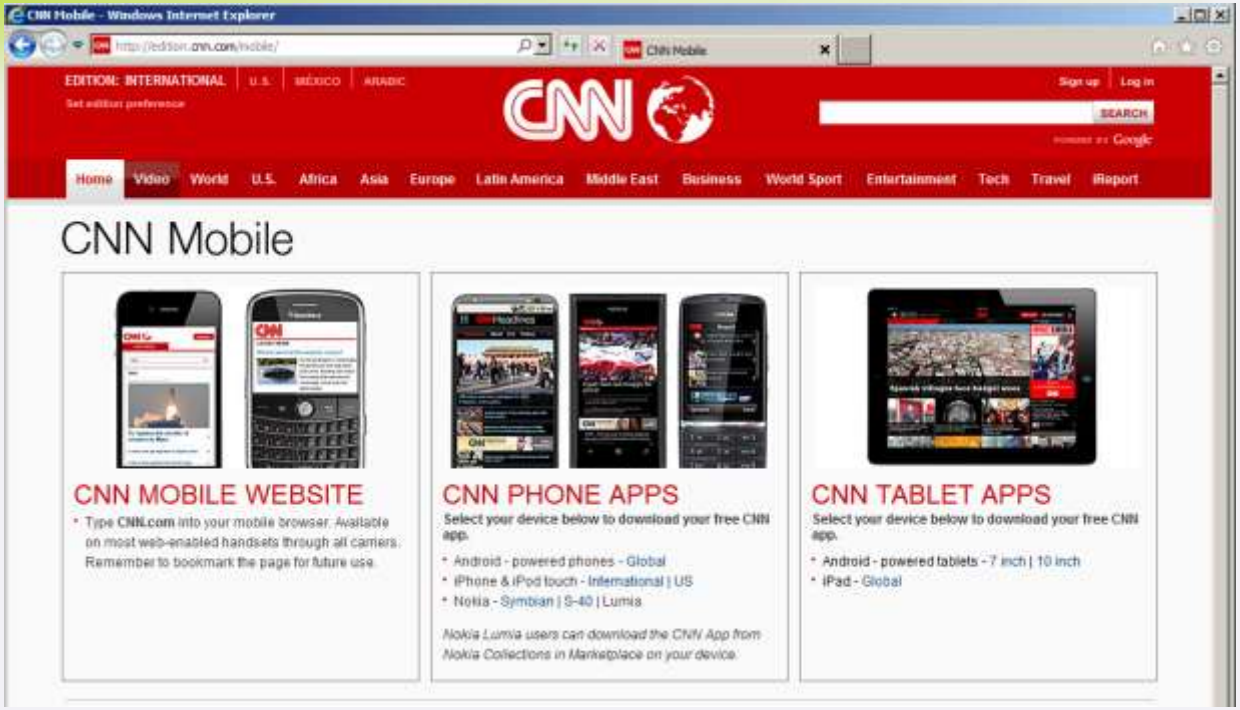
Example: CNN



- Web client for Desktop
  - Full news content
- Mobile web client
  - Focused content
  - Quick and easy access to scrollable news stories
- Native device apps
  - Quick and easy access to scrollable news stories
  - Location based news (GPS)
  - iReport – data collection,i.e. pictures/videos
  - Built-in Marketing via App Stores

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GIS Data?

Native App

Web App

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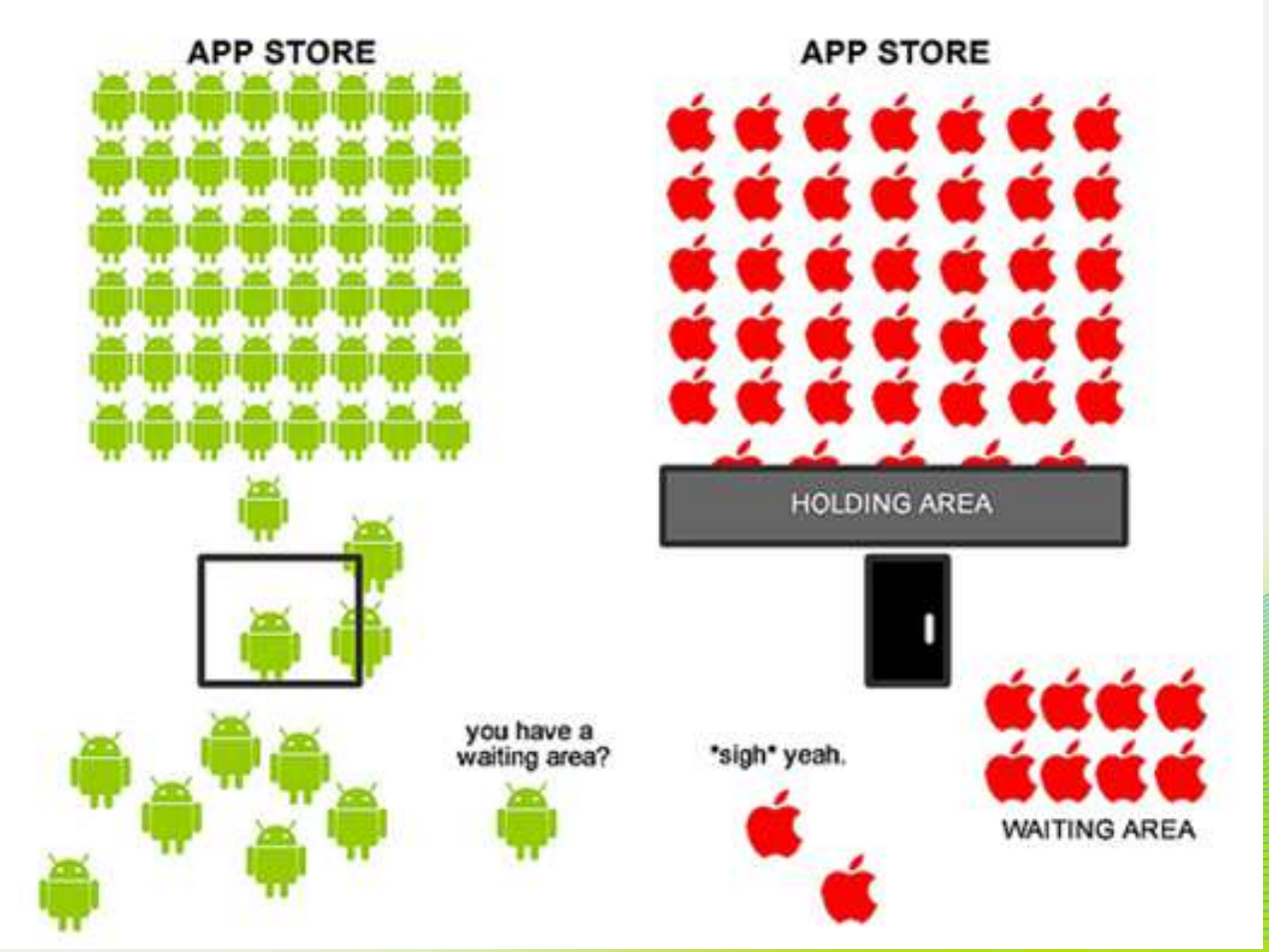
App Deployment

- Native Apps: App Stores (or Manually)
- Web Apps: Full Control



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National Geographic World Map App

- Esri and National Geographic collaborated to produce a distinctive basemap that reflects National Geographic's cartographic design, typographic style, and map policies.

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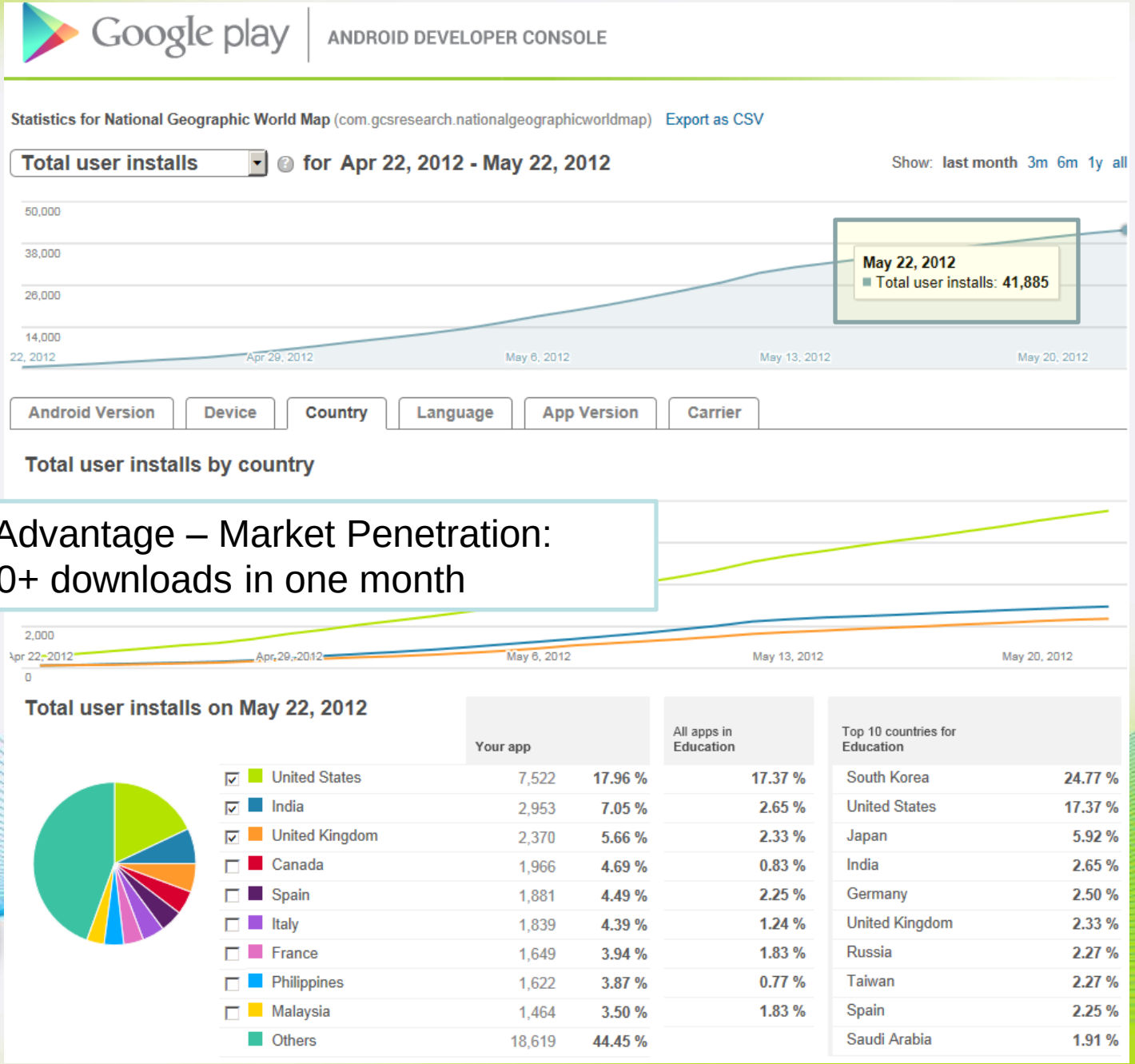
ANDROID APP ON Google play

Statistics for National Geographic World Map



App Store Advantage – Market Penetration:
40,000+ downloads in one month

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Mobile Web App Mapping APIs

- ArcGIS API for JavaScript (compact)
- Leaflet (Cloudmade)
- Modest Maps (MapBox)
- OpenLayers Mobile

- jQuery mobile: HTML5-based UI for cross-platform

HTML and JavaScript

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Native App Mapping APIs

- Device Operating System: Android, iOS, etc.
- Esri ArcGIS Runtime for iOS, Android, Windows, Linux
  - Esri: everything is a Device
  - Windows 8 Metro – full screen immersive apps

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Native Plug-In: Adobe Air

- ArcGIS For Flex
  - Adobe Flash Player on web
  - Adobe AIR on desktops
  - Adobe AIR on mobile devices
- Can be sluggish
- Need to install AIR plug-in

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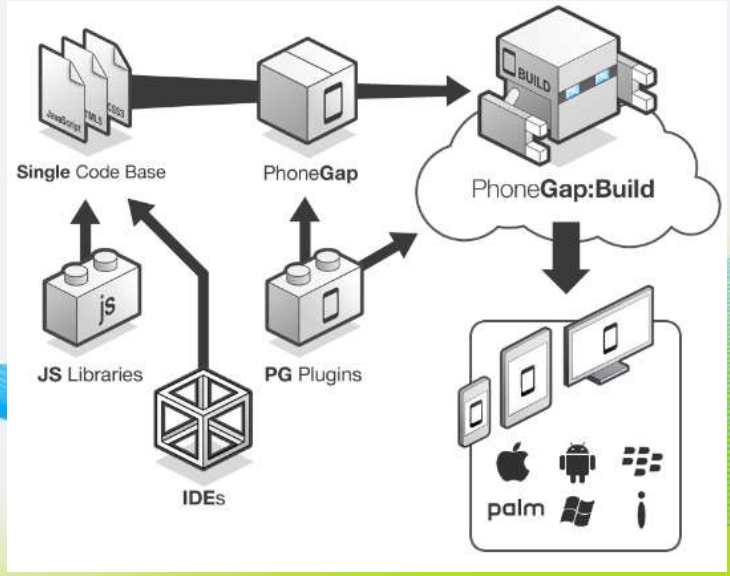
Hybrid Apps: Native apps with web focus

- Advantages
  - **One app for all devices w/ Advantages of Native Apps**
  - Quicker/Easier development and maintenance
  - Market Penetration that app stores provide
  - Access to device hardware capabilities and other apps
  - Others depending on the SDK
- Drawbacks
  - Many of the same as Native Apps (vs. Web Apps)
  - Others depending on the SDK
  - Security
  - Common GIS requirements



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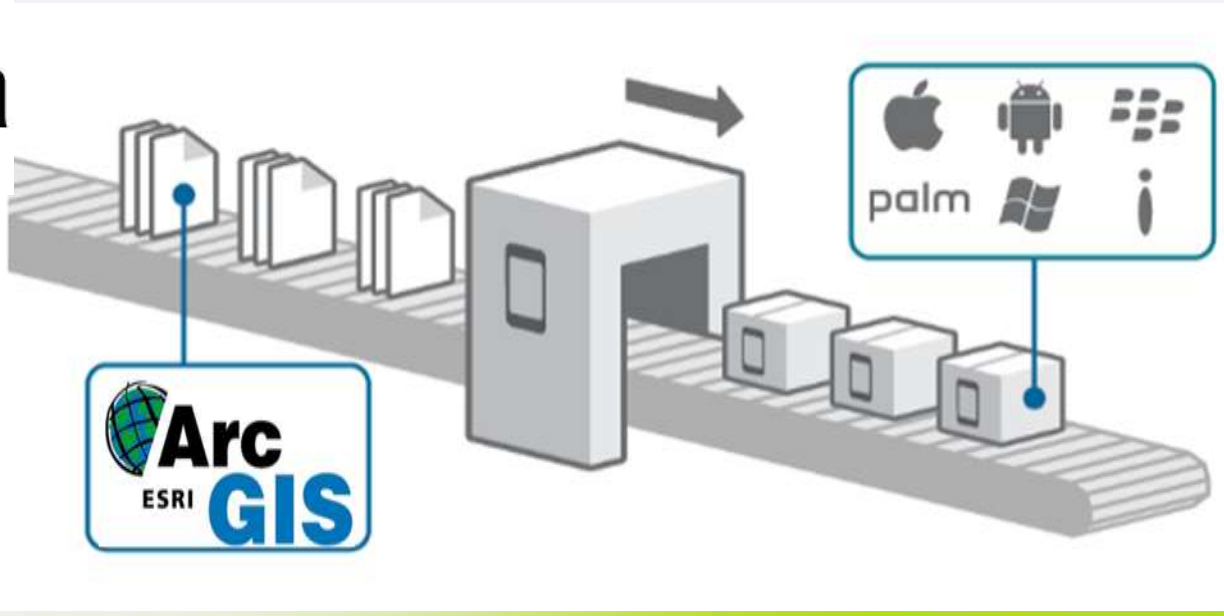
Hybrid Apps: Native apps with web focus

- Web/Native Hybrid Technologies
  - PhoneGap
  - Titanium
  - Sencha Touch
  - MonoTouch
  - jQTouch - beta

Titanium
Mobile API Reference

PhoneGap

Sencha



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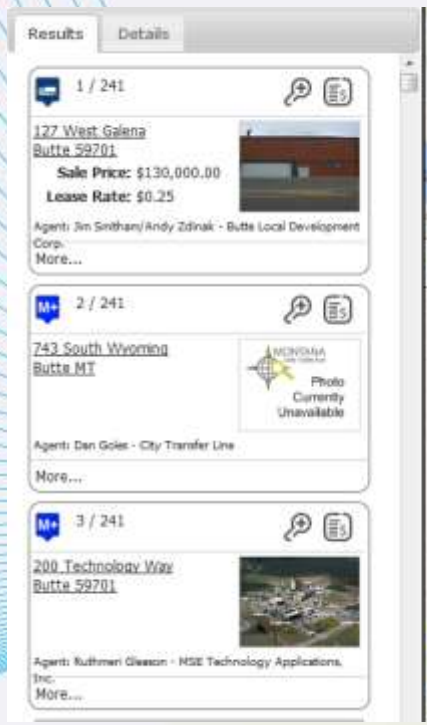
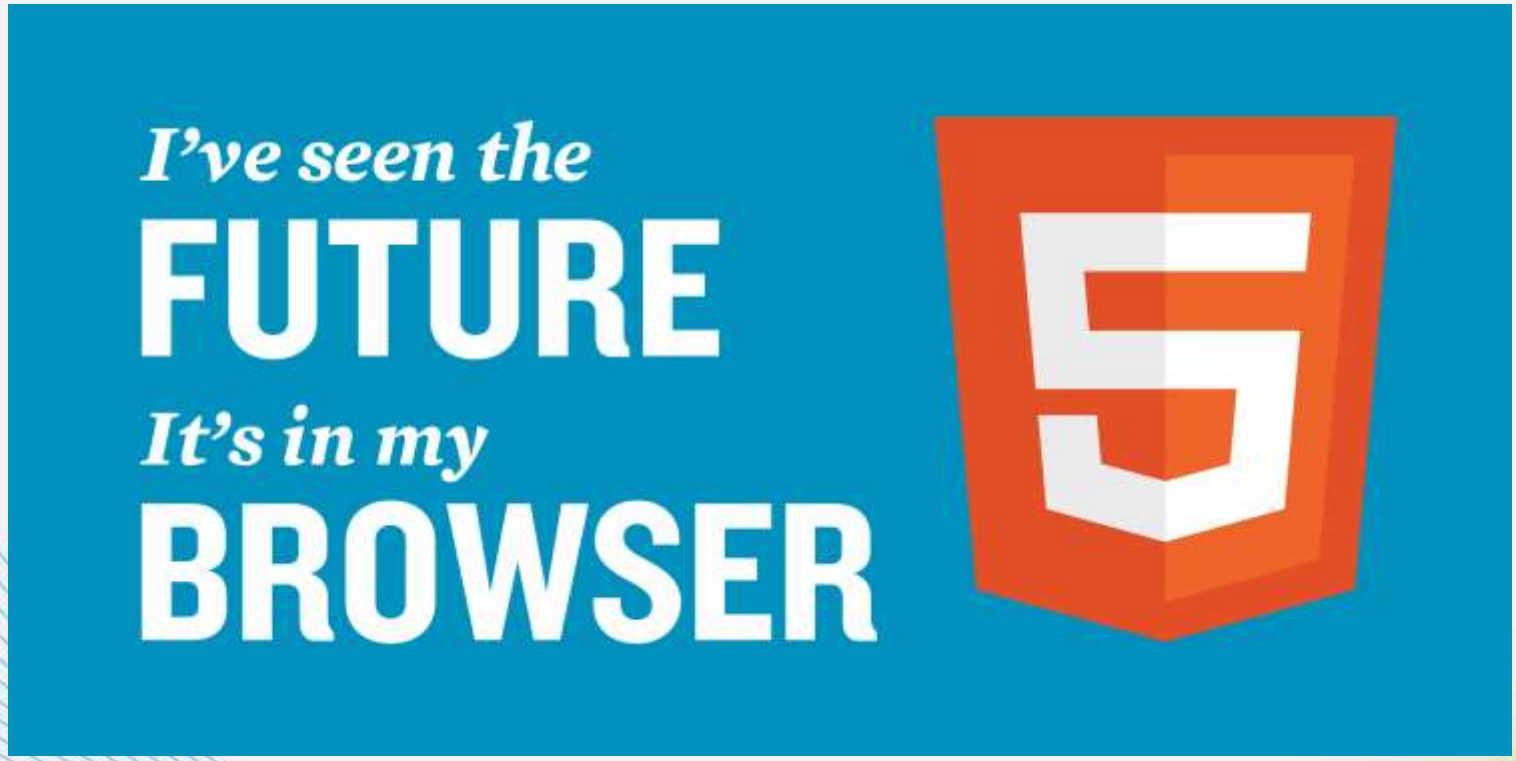
Montana Site Selector

- Developed for businesses looking to open, expand or relocate in Montana.
- GCS Research integrating PhoneGap and ArcGIS Server to solve the multi-platform problem for Esri Enterprise GIS customers



Where is this going?



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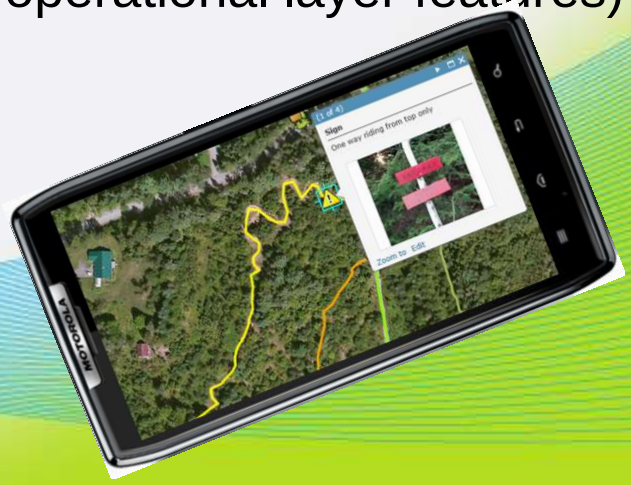
GIS Mobile Apps: Right Now

- Majority of Native Apps can be created as a Web App
- Maybe not so true for GIS Apps

- Common GIS App Requirements that suggest a Native App
  - Hardware intensive (i.e. local geometry (geoprocessing) operations)
    - Real-time mapping (i.e. crowd sourcing, vehicle tracking, display tracking)
  - Exploit device features (i.e. Bluetooth)
  - Offline usage (local tile cache and in-memory operational layer features)
  - Augmented Reality



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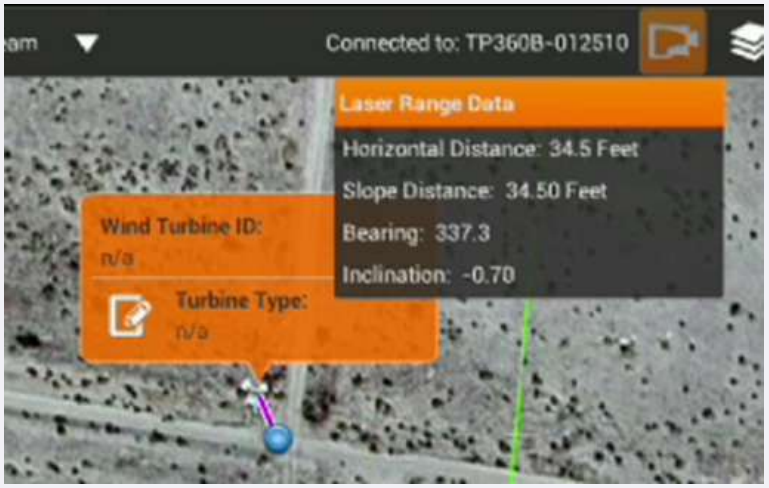
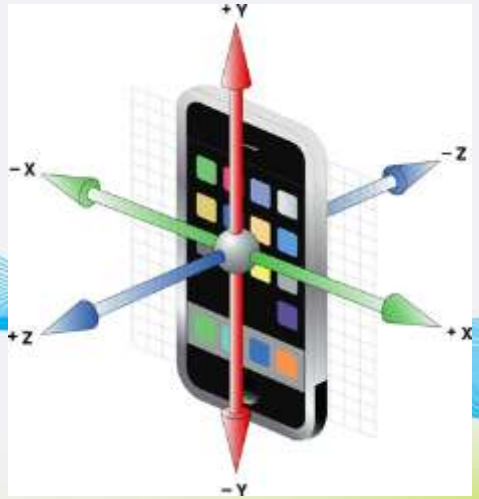
Smartphone Sensors

- Bluetooth, i.e. Range Finder
- GPS
- Camera
- Accelerometer
- Magnetic Field
- Temperature
- Proximity
- Orientation
- Light





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Barcode Scanner & GIS Inventory

- GPS Sensor
- Camera Sensor
- Internet

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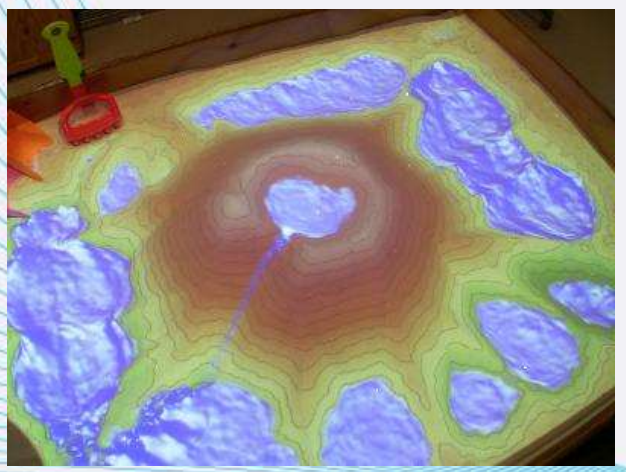
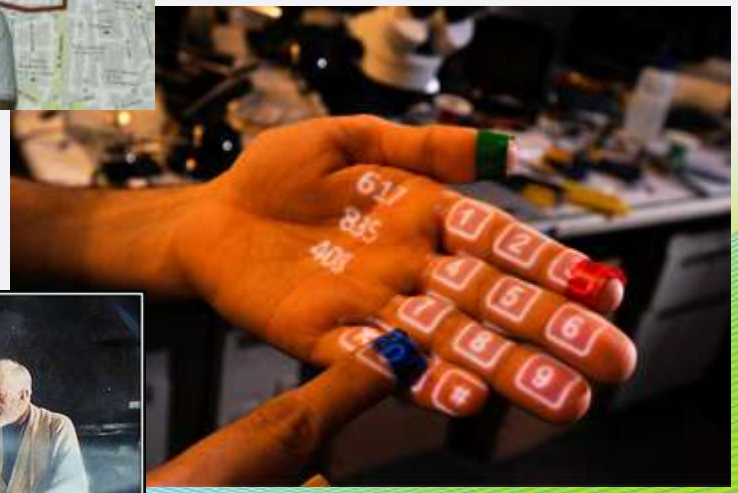
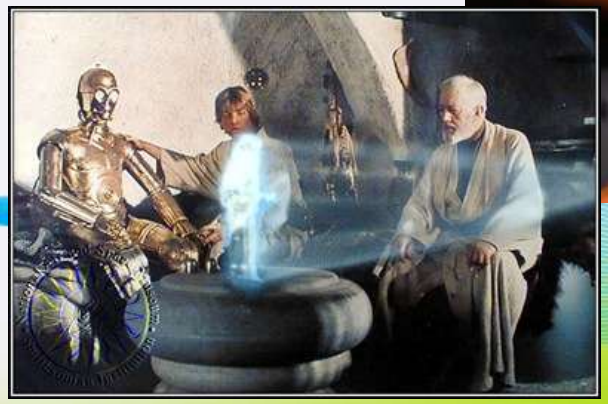
Augmented Reality

- Blurs line between what's real and what's computer-generated by enhancing what we see, hear, feel and smell.
- Sandbox







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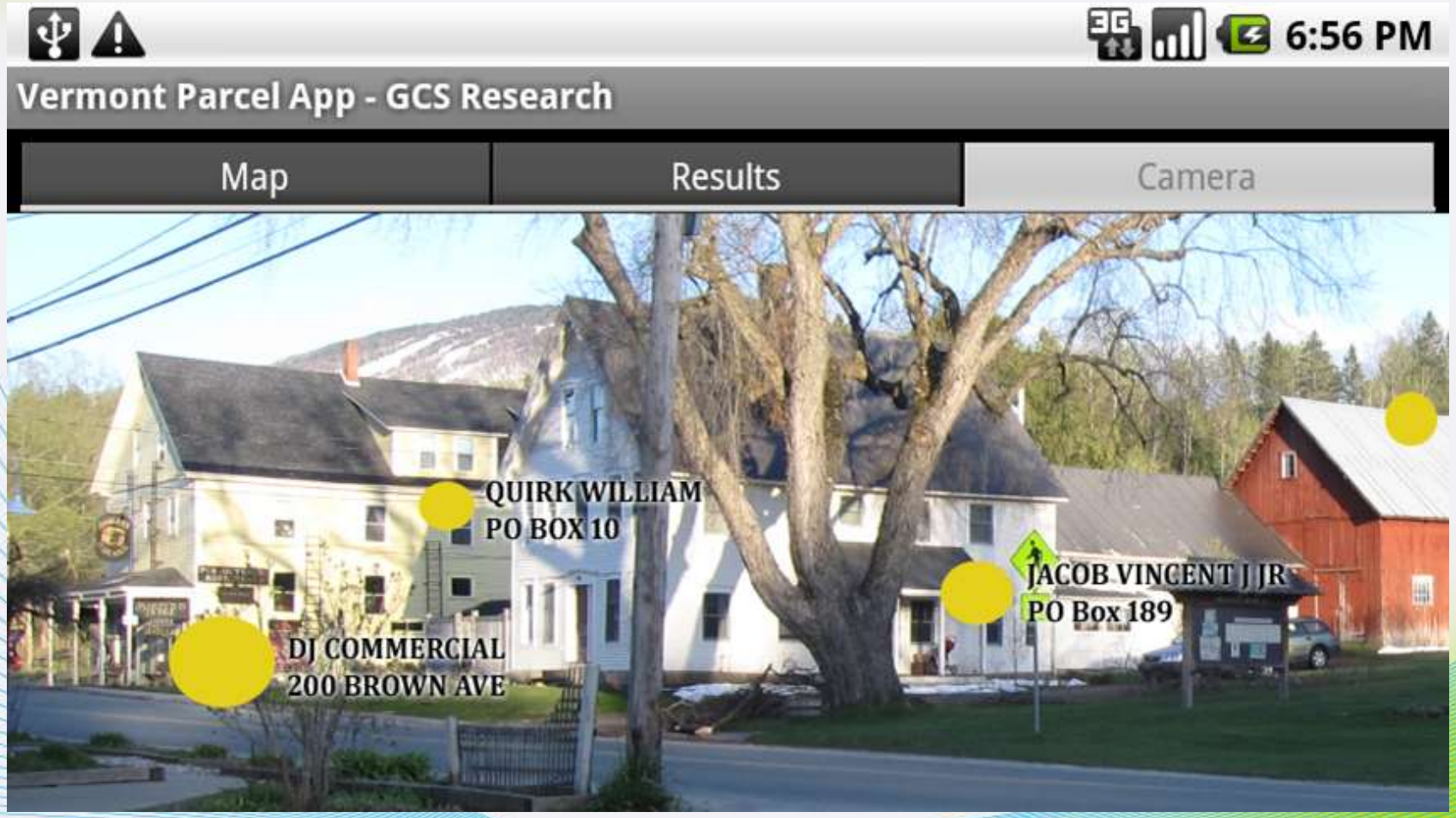
Augmented Reality

- GIS AR



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Custom Routing

- ArcGIS Runtime SDK
- ArcGIS JavaScript SDK

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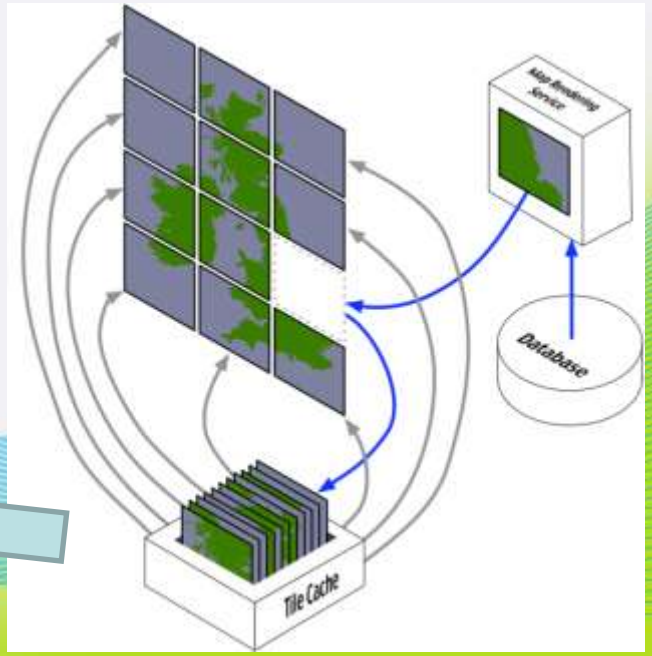
Offline: Caching map data when reception is unavailable

- Base map data offline: deploy as tile package directly to device
  - Map package exported from ArcGIS Server via ArcMap
- Operational Data Offline: in-memory
  - Download features into memory via Feature Service
- Option: Store data on SD cards
- Editing Offline: via Feature Service
- Simple geometry engine: off-line



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Bringing mobile into the security infrastructure

- Smartphone – secure local data/access
  - Screen Lock Phone; Password; Enable Remote Locate, Lock and Wipe
  - Centrally administered protection for domain and non-domain users
  - Embedded device identity protection: Personal security token/credentials
  - ***Encrypt data – Map Tile Package***
- Transmission Security– remote data/access, i.e. web services
  - ***HTTPS/SSL – Map Services***
  - Enterprise Authentication – Certificates
  - VPN
  - Cloud protection
    - Security as a Service (SecaaS) architecture enables cloud based security services for smartphones
    - Cloud mitigates the need for maintaining associated overhead
  - **Offline Apps**
- **Security requirements may drive decision: Native App vs. Web App**

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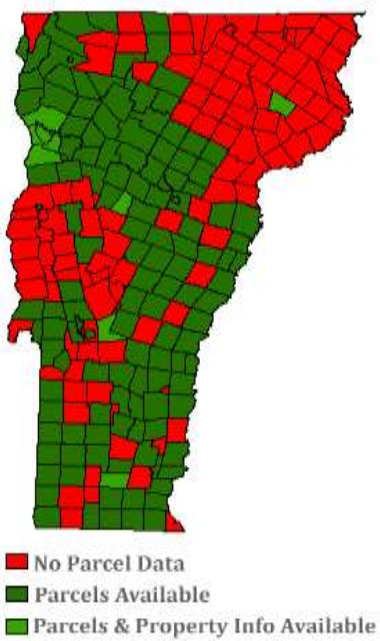
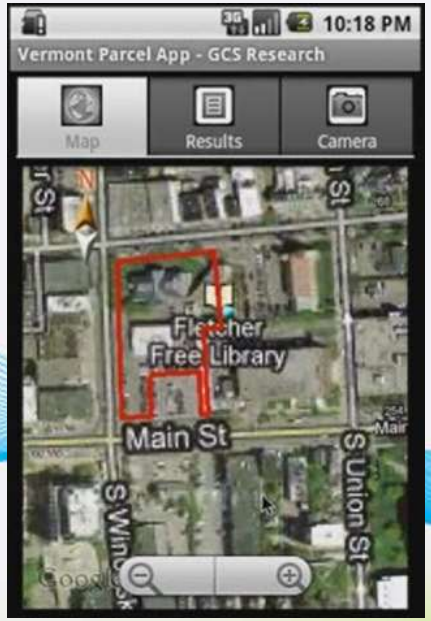
Vermont Parcel App

- Google Android
- ESRI ArcGIS Server
- Parcels from VCGI
- Grand List data from towns
- Data to be updated shortly





GCS Research Parcel Apps

- First published Google Android Apps to use Esri technology
- 10,000+ downloads
- Coming soon:
  - Data updates
  - iPhone/iPad & Windows 7
  - New Apps for states/cities

Current Apps for:

- Montana
- Vermont
- Washington
- Denver
- San Diego

ANDROID APP ON Google play

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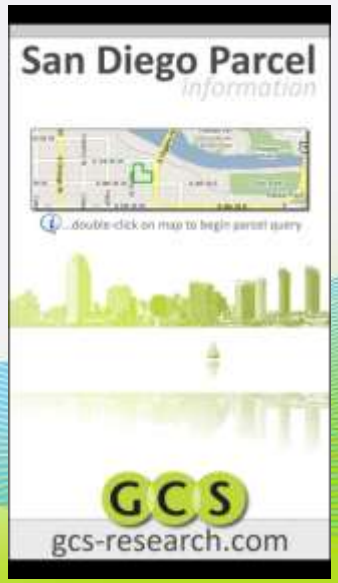

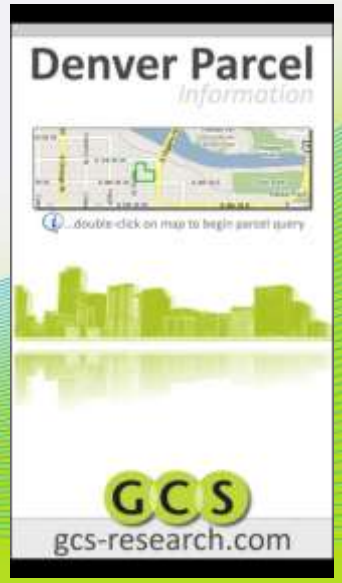

Town of Brookline, Massachusetts

- **“Where Am I”** App helps locate the closest public transportation, parks and public schools, library, parking lots and parking meters in town.
- Coming soon: iPhone

Town of Brookline
Massachusetts

ANDROID APP ON Google play

Available on the iPhone App Store

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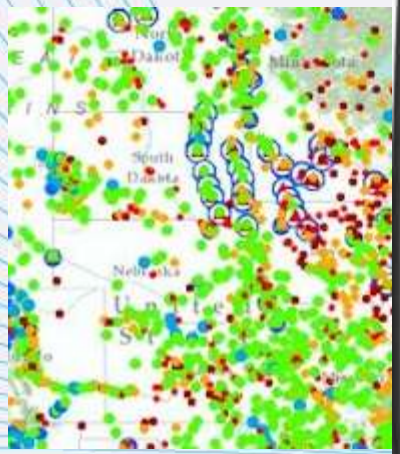
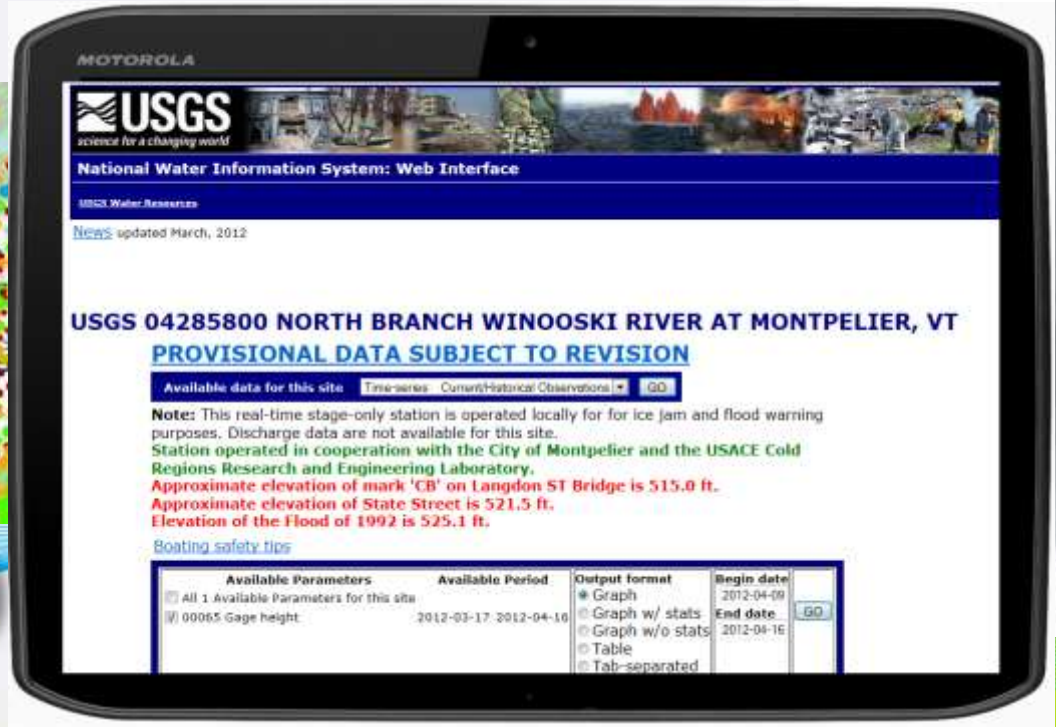
Stream Gauge Map App

- Approximately 5,000 of the 6,900 U.S. Geological Survey sampling stations are equipped with telemetry to transmit data on streamflow, temperature, and other parameters back to a data base for real-time viewing via the World Wide Web.
- http://waterwatch.usgs.gov/
- GPS





ANDROID APP ON Google play

Fire Apps

- **Active Wildland Fires Map App**
  - In order to give fire managers near real-time information, fire perimeter data is updated daily based upon input from incident intelligence sources, GPS data, infrared (IR) imagery from fixed wing and satellite platforms.
- **US Fire History Map App**
  - Displays fire perimeter data from 2000 to 2009 on top of Wildland Fire Potential.
- **About the data**
  - Fire Perimeter data is a product of Geospatial Multi-Agency Coordination (GeoMAC).
  - Fire Potential data is a product of USFS Forest Service Rocky Mountain Research Station (RMRS).

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Rocky Mountain Research Station

GEOMAC WILDLAND FIRE SUPPORT

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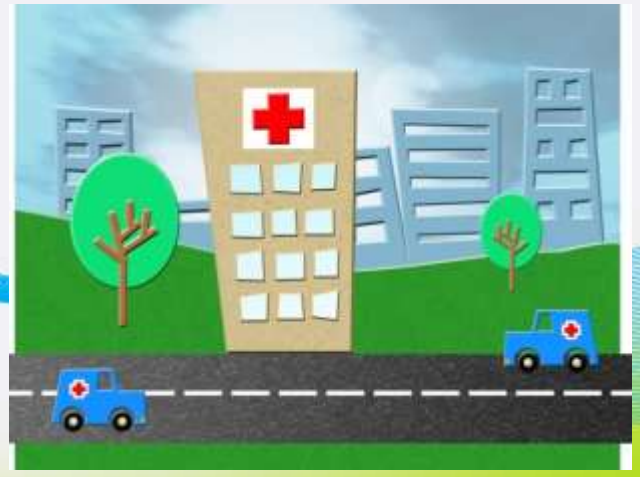
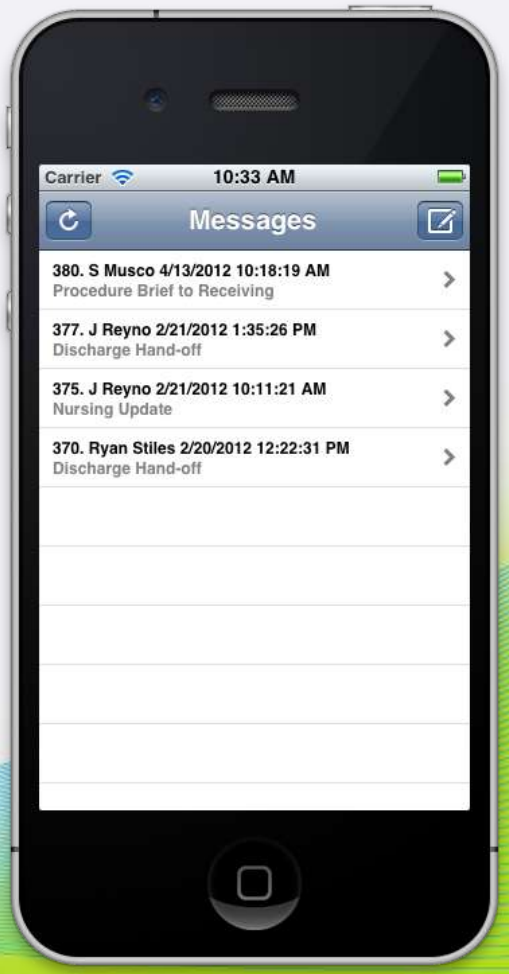
‘Transfer of Care’ App for the iPhone

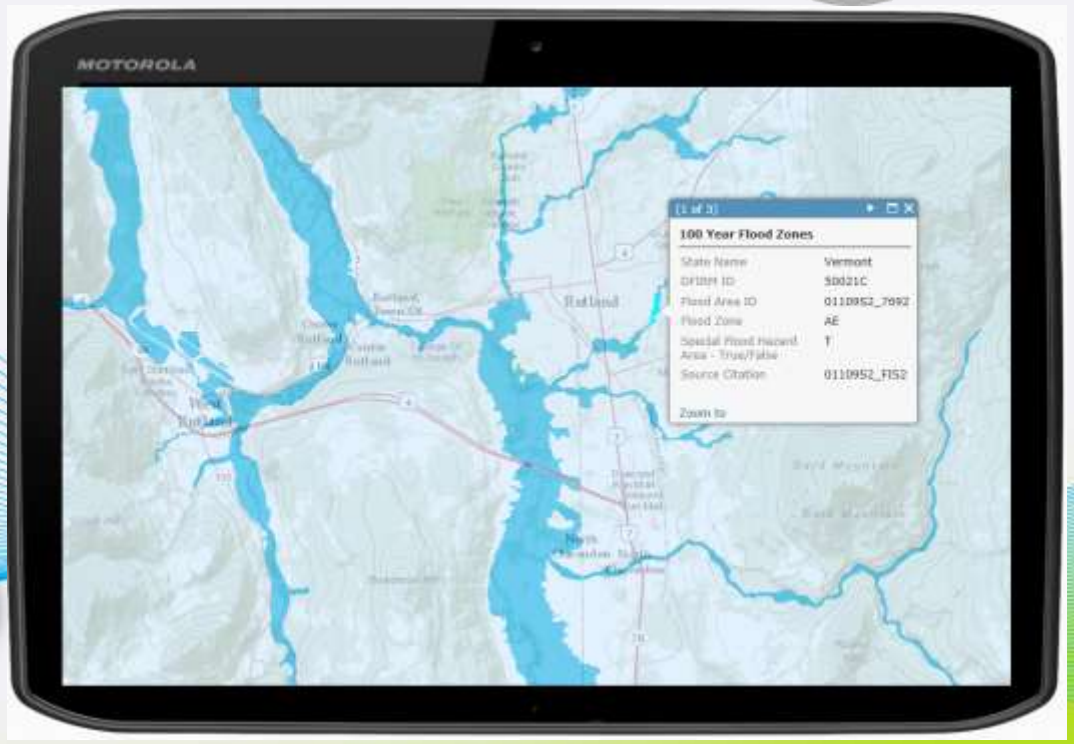
- Secure information sharing App for medical community, i.e. hospitals
- Doctors share video and other relevant real-time information to medical staff
- Highly Secure App
- Sensitive medical information
- Map message locations
- **Not available in the Apple App Store**

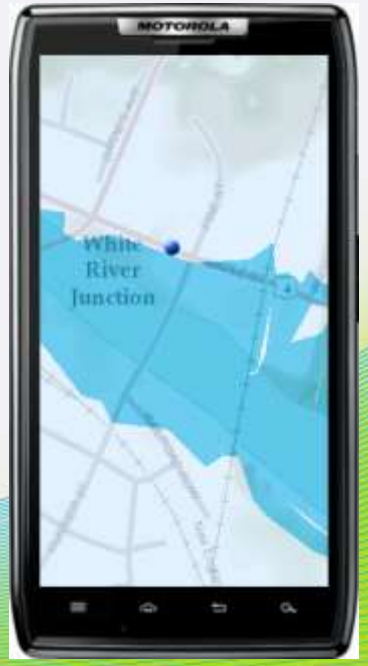




FEMA 100 Year Flood Zone Map App

- The 100-year flood is referred to as the 1% annual exceedance probability flood, since it is a flood that has a 1% chance of being equaled or exceeded in any single year.
- Flood zone data created by FEMA.
- GPS





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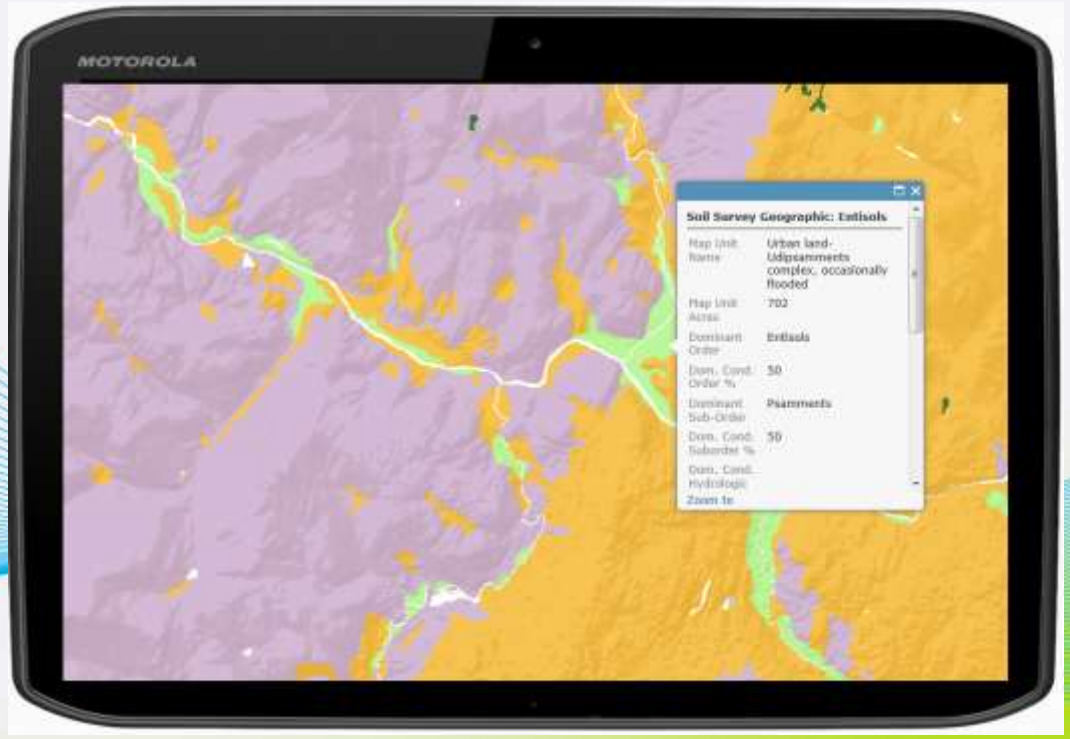
Soil Survey Map App

- Features the Soil Survey Geographic (SSURGO) by the United States Department of Agriculture's Natural Resources Conservation Service.
- It also shows data that was developed by the National Cooperative Soil Survey and supersedes the State Soil Geographic (STATSGO) dataset.
- GPS



United States Department of Agriculture NRCS Natural Resources Conservation Service

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Nuclear Sites Map App

- Map contains approximate buffered (50 and 100 km) locations of world nuclear plants
- The data has not been verified against the nuclear regulatory commission for each country
- Quaternary faults and fold data provided by the USGS
- Contains services from Esri ArcGIS Online
- GPS

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USGS
science for a changing world

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ANDROID APP ON Google play

MPG Ranch – Data Collection App

MPG RANCH

PROTECTING OPEN SPACE FOR FUTURE GENERATIONS

- Scientific sampling tool in the field
- For example, record bird observations using high resolution satellite imagery
- Targeted for iPad 3
  - iPad 3 has much better screen resolution than previous versions
- Connected and disconnected to the Internet
  - Mesh Wifi network in the field
  - Utilizing local cache for GIS data and imagery
- Not available in the Apple App Store

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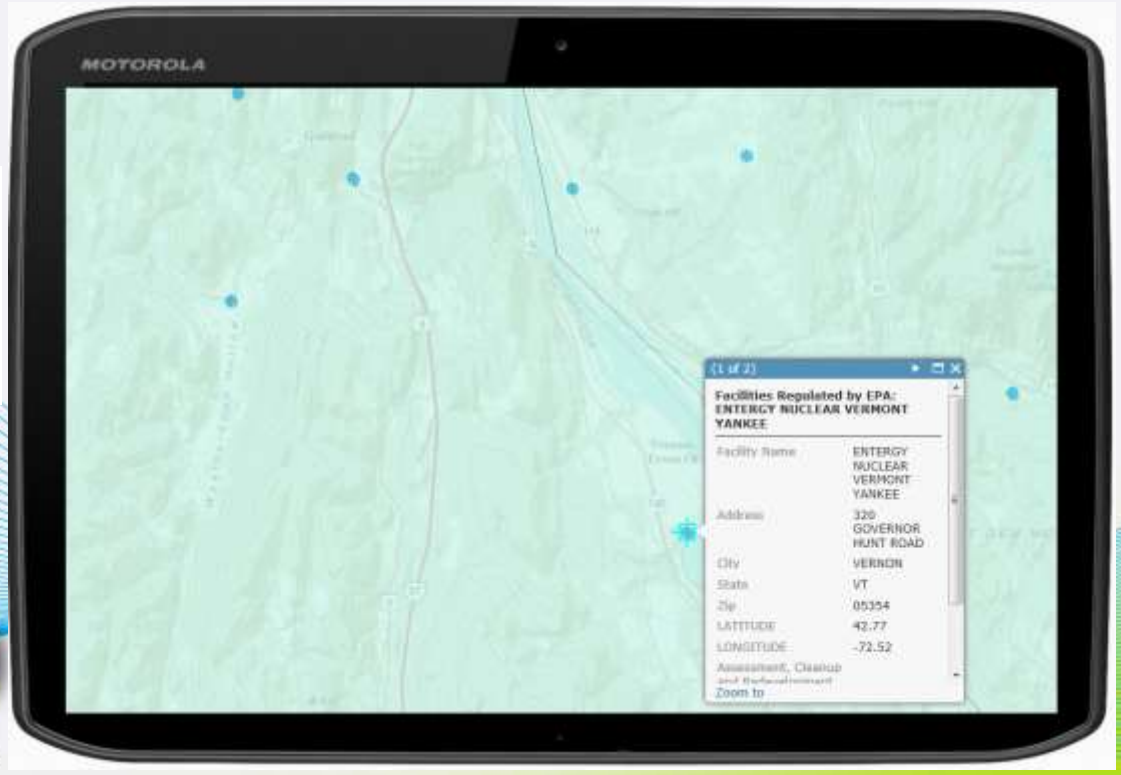
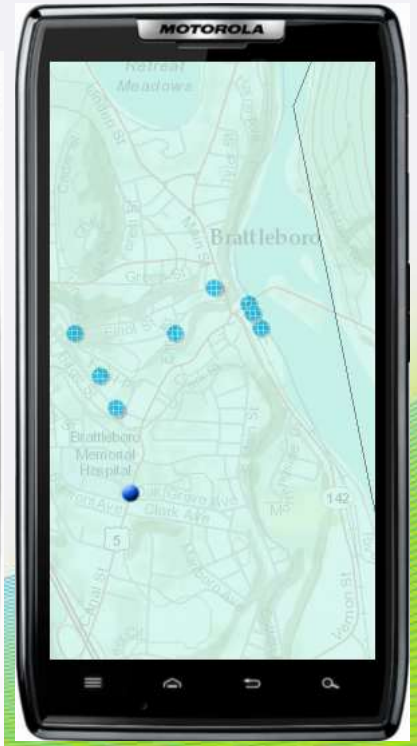
iOS

EPA Watch List Map App

- To improve public health and the environment, the United States Environmental Protection Agency (USEPA) collects information about facilities, sites, or places subject to environmental regulation or of environmental interest.
- GPS

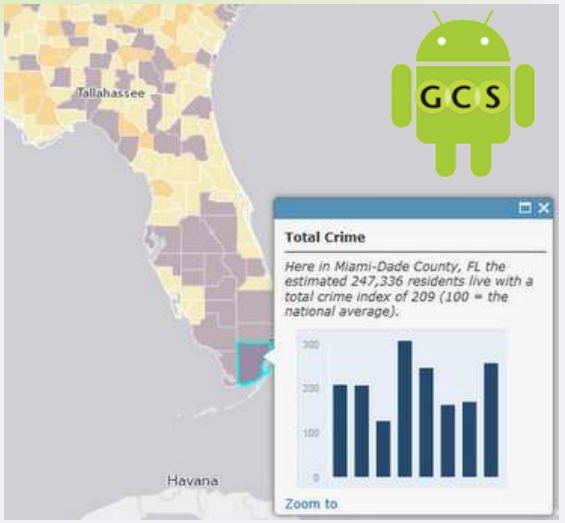


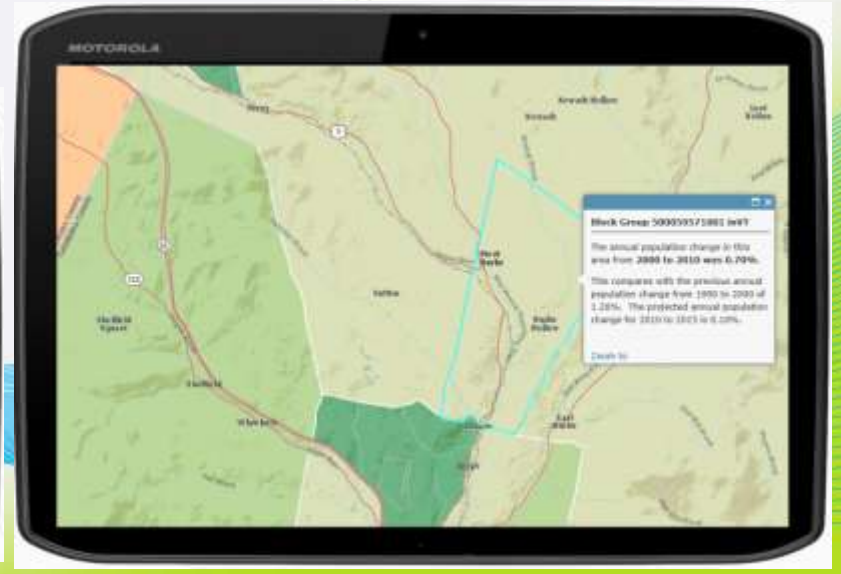


ANDROID APP ON Google play

Demographic Apps

- **Median Household Income Map App**
  - Displays US median household income for the US in 2010
- **Population Change Map App**
  - Displays annual compound rate of total population change in the US from 2000 to 2010
- **Total Crime Map App**
  - Displays index of total crime in state, county, ZIP Code and block group
- Data and services provided by Esri ArcGIS Online





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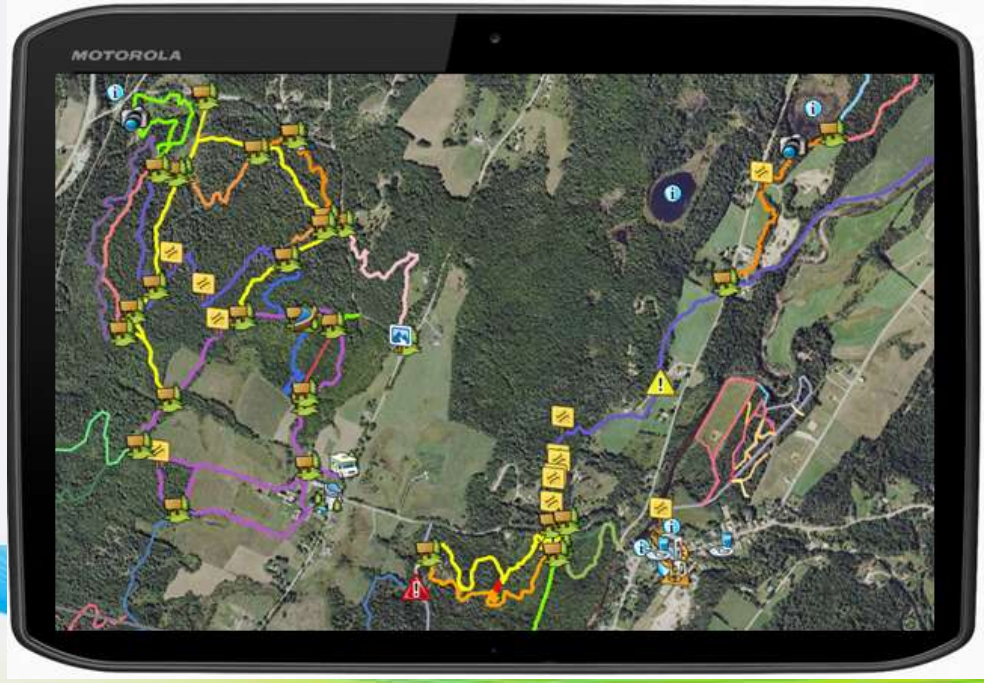
Burke Vermont Bike Trails Map App

- Data published via ArcGIS Online



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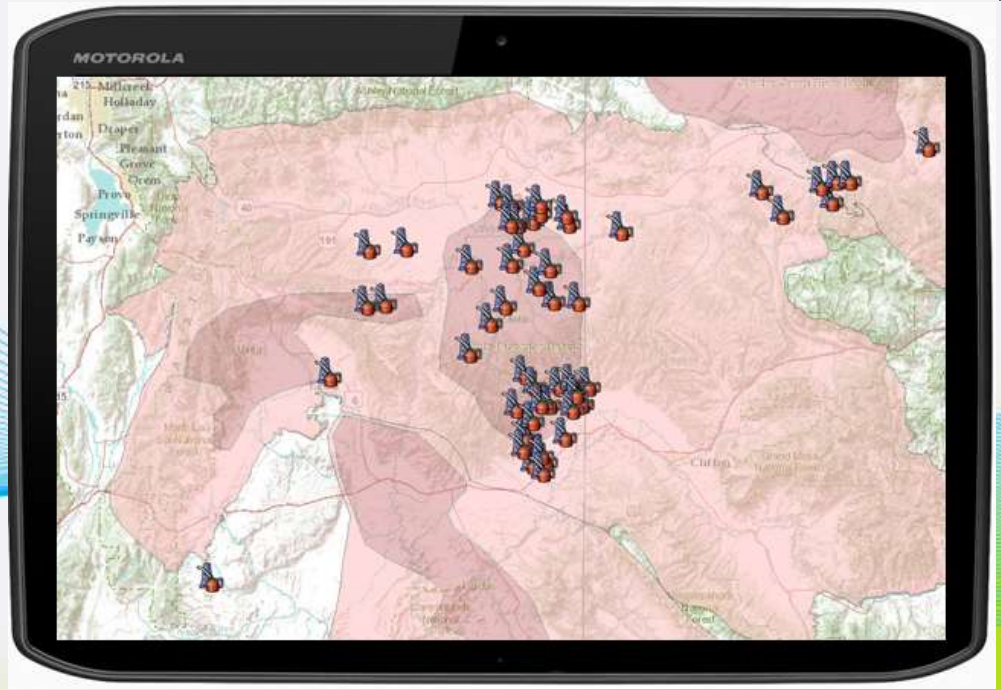
US Oil Field Map

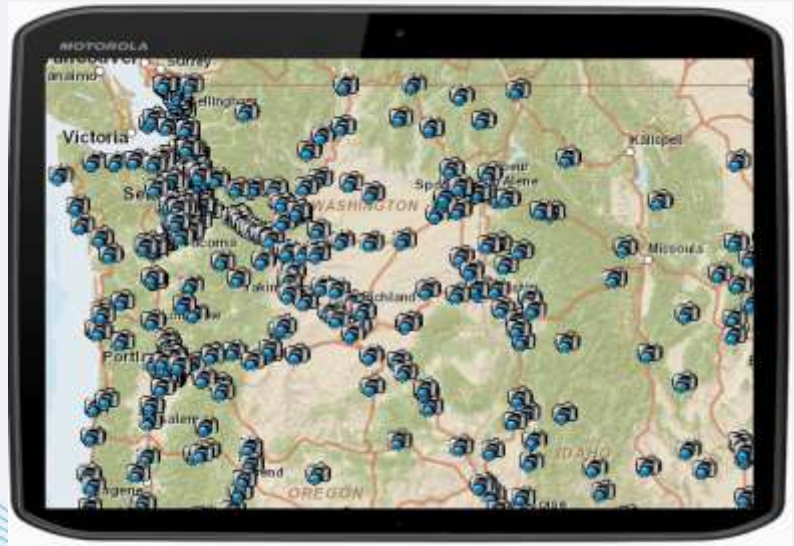
- The map displays oil field and shale gas locations
- Data provided by Department of Energy, Energy Information Administration (EIA)
- Contains services from Esri ArcGIS Online



ANDROID APP ON Google play

US West Traffic Camera Map

- Traffic camera feeds from Oregon, Washington, California, Idaho and Montana
- Feeds from:
  - ODOT
  - WADOT
  - Ctrans
  - IDOT
  - MDOT



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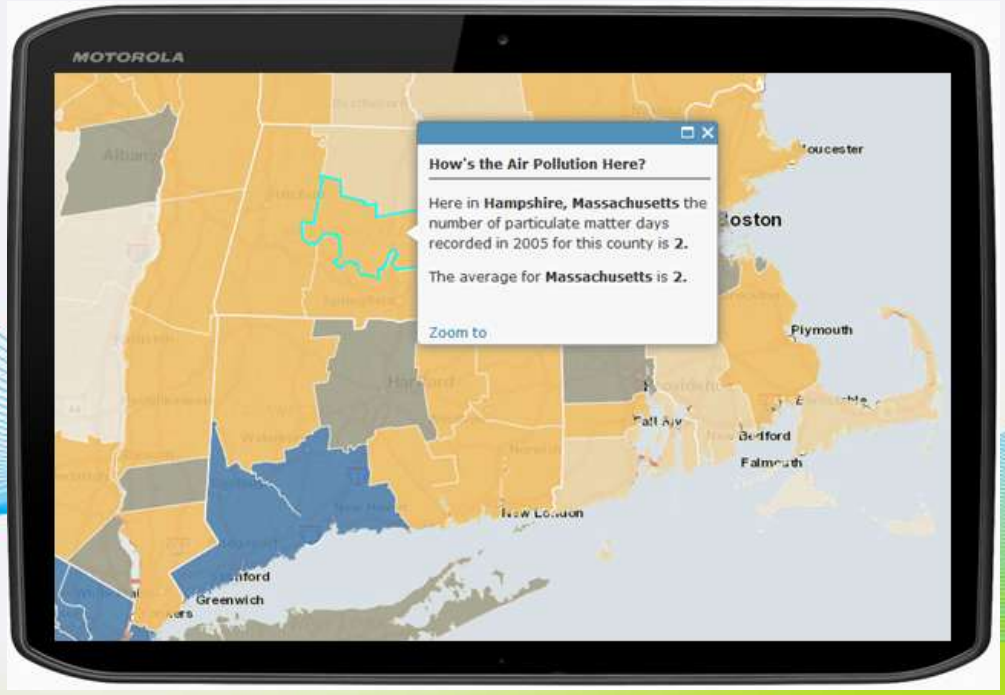
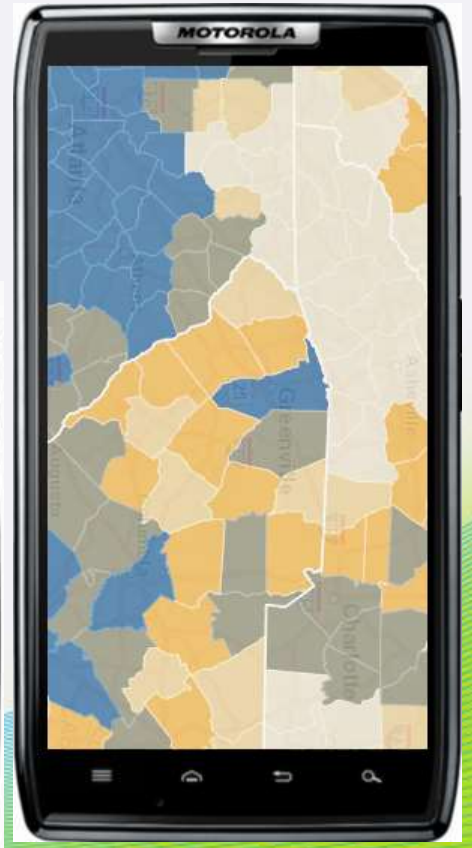
Air Pollution Map

- Displays the number of Particulate Matter Days recorded in the US, by state and county
- Data from the US Dept. of Health and Human Services
- Services provided by Esri ArcGIS Online

HealthyPeople.gov





ANDROID APP ON Google play

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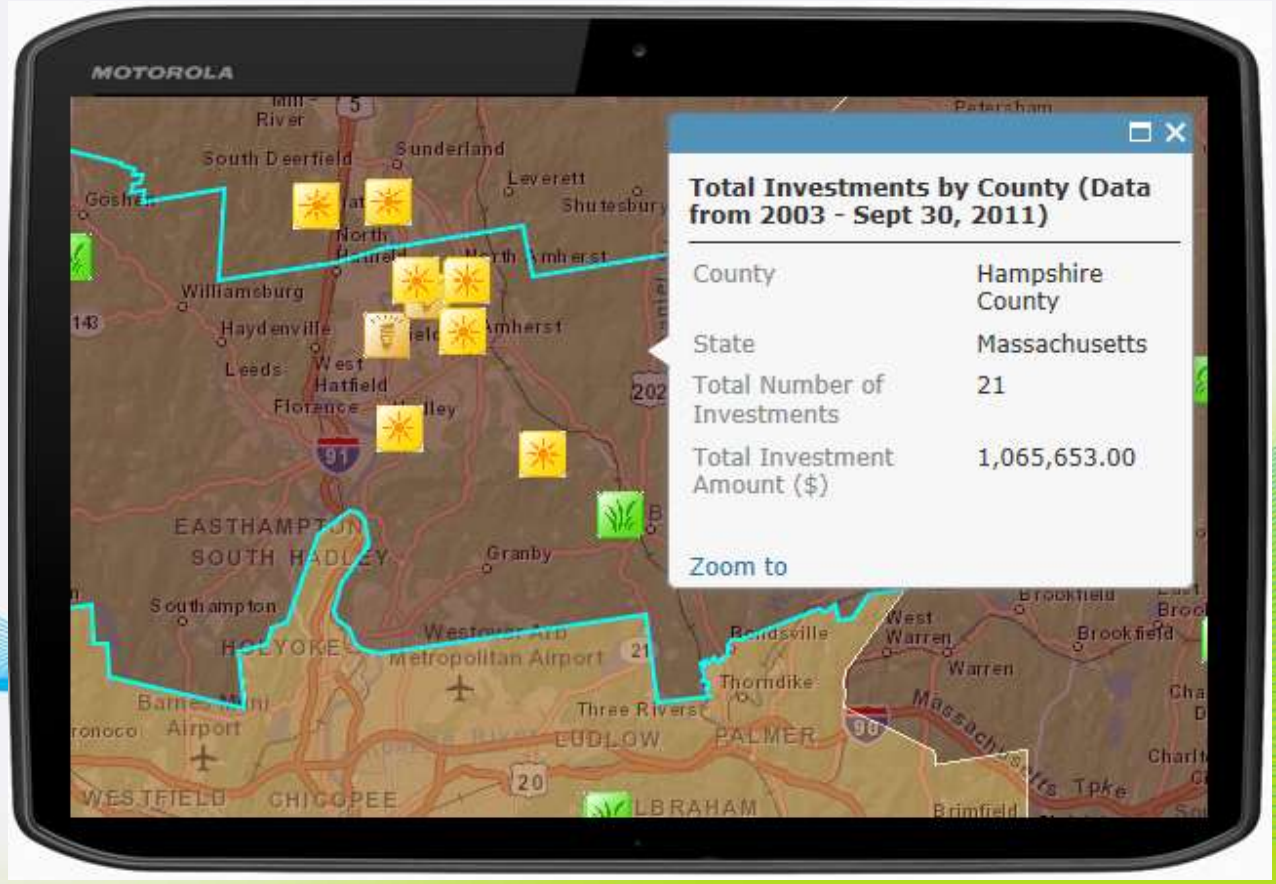
USDA Renewable Energy Investments App

- The Renewable Energy Investments map contains information regarding USDA programs that provide assistance to renewable energy and energy efficiency projects
- Contains services from Esri ArcGIS Online



USDA
United States Department of Agriculture
ADVANCING ReNewable Energy

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Modeling as a Service (MaaS)

I.D.E.A.S.™ - Intelligent Data Exploration and Analytics System

an Analytic Services and Delivery Platform available to a variety of users

I.D.E.A.S. makes Remote Sensing and Geospatial Information Systems data readily discoverable, accessible, visualized and useable

Finding the Right Geospatial Data and Models

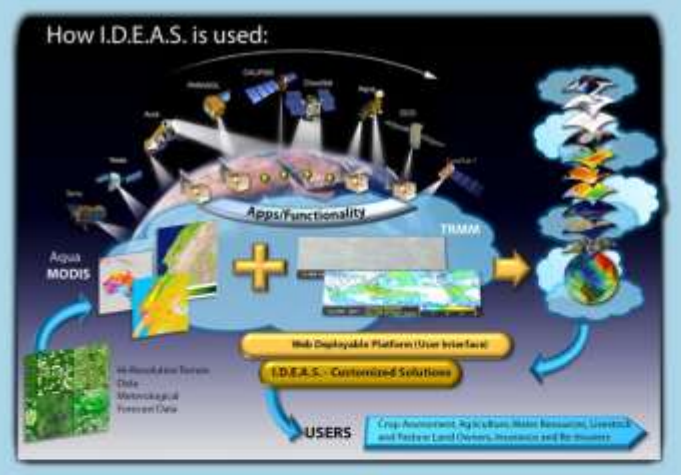
I.D.E.A.S. is a concept that will simplify the discovery, processing and analysis of earth observation data and models. By providing a single interface into federated, disparate data repositories, I.D.E.A.S. will allow users on-demand access to a vast array of satellite and aerial imagery and maps to create value-added visualization products, to utilize data for modeling, and to generate decision-support tools.

Visualization and Analysis Power

I.D.E.A.S. will integrate a web storefront, smart engine and high performance computing backbone to rapidly deploy data, models and analytic capabilities. The web storefront will be a one-stop shopping experience to query, discover, access and execute data and models. The smart engine will leverage innovative methods, such as learned workflows based on a user's problem and solution, to provide near real-time Modeling as a Service (MaaS) functionality for product generation, model calibration, user feedback, and collaboration. The high-performance cloud computing backbone will provide the processing power to generate analytic and visualization products.

Tailored Services for a Variety of Users

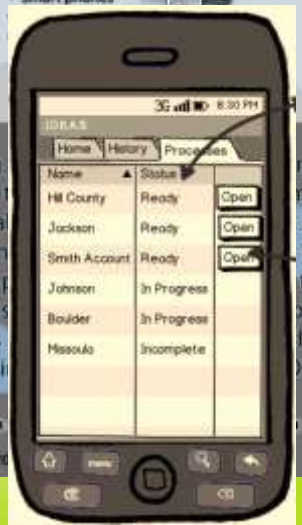
I.D.E.A.S. will benefit a wide spectrum of users who want to use image, geospatial, weather, and other remotely sensed data from public sources like NASA and commercial sources for applied science and commercial applications that benefit society. Users will have the ability to upload models, discover other users' models, and download newly-developed products, and solutions. Additionally, I.D.E.A.S. will provide the means for users to develop, exploit, and utilize products and collaborate on solutions in a community of users with similar domain interests.



From NASA Data to End-User:

Problem Solved, Product Delivered

- Web clients
- Smart phones



I.D.E.A.S. is being developed and implemented by the SI through corporate partnerships and licensed technologies

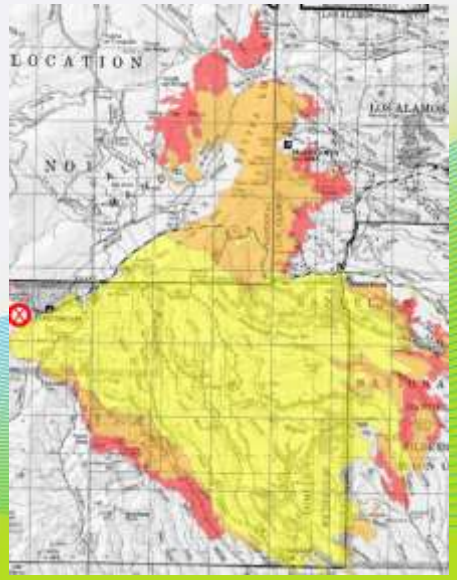
the SI · GCS research · esri · GLOBAL MARKETING INSIGHTS, INC. · Ideas and Machines, Inc. · IBM

The SI C… engineer… Defense… simulatio… manage… cost-effe… deliverin… 2,000 pe…

for more information, conta…

Cloud and Supercomputing

- Rapidly deliver geoprocessing and complex analysis results
- Androids used to spin weather for forest fires;
- Predict fire direction/perimeter
- Real-time coordination



Questions?

John Waterman, PMP, GISP
Vice President of Geospatial Solutions, GCS Research
East Burke, Vermont
802.473.4009 - jwaterman@gcs-research.com

"Everything is related to everything else, but near things are more related than distant things"
- Waldo Tobler

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